Space Weather Forecast

Issued on Monday, 27 February 2023 at 13:31 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor to G2/Moderate storms expected, and chance G3/Strong storms 27-28 Feb. R1-R2 Blackouts likely throughout.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Low, with only one notable Common-class flare from a complex region in the northwest quadrant. There are two further complex regions on the disc, a region close to the northwest limb, which appears to be simplifying and fading. A further region in the southwest quadrant is also simplifying. There are a further five sunspot regions on the visible disc, but these are all either fading or inactive. No new Earth-directed CMEs have been observed on available imagery.

Solar Wind / Geomagnetic Activity: Solar wind parameters are indicative of two potential CME arrivals with the second one a little more uncertain. The first was indicated by an increase from slightly elevated levels due to a fast solar wind, to elevated to strong levels due to a CME arrival late on 26 Feb. A further increase to strong or very strong levels was then observed on 27 Feb, although it is currently unclear if this is a further CME. Total magnetic field strength has been at mainly moderate levels, with two peaks to strong levels late on 26 Feb and during 27 Feb. The north-south component started near neutral or just positive, but has been mainly negative since late on 26 Feb, with two strong negative peaks in line with the peaks in the total magnetic field. Geomagnetic activity started Unsettled (Kp 3) before rising to G1/Minor (Kp5), then has been G2/ Moderate (Kp 6) storm level from 27/0000UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles has fallen from storm levels to background levels through the last 24 hours as the proton storming from the CME subsided.

Four-Day Space Weather Forecast Summary
Solar Activity: Low or Moderate activity is expected through the next four days, due to a number of significant sunspot regions on the visible disc. There is also a chance of Strong flare activity.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 24 Feb is currently affecting the Earth, with a further CME, which erupted on 25 Feb forecast to arrive during 27 Feb. Both CMEs are expected to reach speeds of 600-700km/s at Earth. A fast solar wind is also connected with Earth, but the effects and evidence of this are largely masked by the CMEs. The high speed stream is likely to be around 500km/s, with this expected to wane through 01 and 02 Mar. G1/Minor or G2 /Moderate storms are expected on 27 Feb and into 28 Feb with a chance of G3/Strong storms. There is then a decreasing risk of G1 or G2 storms through 01 and 02 Mar.

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Energetic Particles / Solar Radiation: The high energy proton flux (greater than 2MeV) is below the storm levels, but could increase to storm levels again on 27 Feb due to a further CME arrival. There is then a reducing chance later in the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	80	70	30	10
Strong	G3	No	30	30	5	1
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	40	30	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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